

# Saltstone Production and Disposal Facility Website Data - Fourth Quarter, Calendar Year 2013

## Z-Area Saltstone Disposal Facility Permit General Condition B.5.a-h Information and Consent Order of Dismissal, Section III.7

Permit Condition	Requirement	Estimated Value	Updated Value	Comments
B.5 a)	Cumulative process volume of salt waste disposed to date	Not Applicable	8,767 kgals Vault 4, Cells B, D, E, F, H, J, K, L SDU 2, Cells 2A and 2B SDU 5, Cell 5B	
b)	Process volume of saltstone grout disposed and vault/disposal unit location (including cell identity) for the reporting period	Not Applicable	9.9 x 10 <sup>1</sup> kgals SDU 2, Cell 2A  0.00 x 10 <sup>0</sup> kgals SDU 2, Cell 2B  0.00 x 10 <sup>0</sup> kgals SDU 5, Cell 5B	Grout height recorded as 0.25 feet before and after salt solution being disposed of in SDU 5, Cell 5B. Therefore, amount of grout disposed in SDU 5, Cell 5B to small too record.
c)	Cumulative process volume of saltstone grout disposed to date	Not Applicable	1.5 x 10 <sup>4</sup> kgals Vault 4, Cells B, D, E, F, H, J, K, L SDU 2, Cells 2A and 2B SDU 5, Cell 5B	
d)	Remaining vault/disposal unit volume	Not Applicable	9.3 x 10 <sup>2</sup> kgals Vault 4  9.9 x 10 <sup>1</sup> kgals SDU 2  4.9 x 10 <sup>3</sup> kgals SDU 5	Grout height recorded as 0.25 feet before and after salt solution being disposed of in SDU 5, Cell 5B. Therefore, amount of grout disposed in SDU 5, Cell 5B to small too record.
e)	Curies disposed and vault/disposal unit location for the reporting period	0.357 kCi SDU 2, Cell 2A  0.024 kCi SDU 5, Cell 5B		Due to the lapse of appropriations funding in October 2013 the 4Q13 sample results are not yet available. The 3Q13 sample data was used to estimate chemical and radiological inventory for the 4Q13. Inventory data for 4Q13 will be updated in the 1Q14 Report.
f)	Cumulative inventory of curies disposed to date	414 kCi Vault 1, Cells A, B, C Vault 4, All Cells SDU 2, Cells 2A and 2B SDU 5, Cell 5B		
g)	Curies of highly radioactive radionuclides disposed and vault/disposal unit location for the reporting period	0.357 kCi SDU 2, Cell 2A  0.024 kCi SDU 5, Cell 5B		Due to the lapse of appropriations funding in October 2013 the 4Q13 sample results are not yet available. The 3Q13 sample data was used to estimate chemical and radiological inventory for the 4Q13. Inventory data for 4Q13 will be updated in the 1Q14 Report.
h)	Cumulative inventory of highly radioactive radionuclides disposed to date	414 kCi Vault 1, Cells A, B, C Vault 4, All Cells SDU 2, Cells 2A and 2B SDU 5, Cell 5B		

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## Consent Order of Dismissal, Section III.7 (1) Chemical and Radiological Composition of Salt Waste

Chemical Name	Estimated Concentration (mg/L)	Updated Concentration (mg/L)
<b>Major Constituent</b>		
Water [H <sub>2</sub> O]	8.81E+05	
<b>Solvated Ions</b>		
Aluminate [Al(OH) <sub>4</sub> ]	1.43E+04	
Carbonate [CO <sub>3</sub> <sup>2-</sup> ]	1.21E+04	
Chloride [Cl <sup>-</sup> ]	5.00E+02	
Fluoride [F <sup>-</sup> ]	5.00E+02	
Hydroxide [OH <sup>-</sup> ]	3.29E+04	
Nitrate [NO <sub>3</sub> <sup>-</sup> ]	1.36E+05	
Nitrite [NO <sub>2</sub> <sup>-</sup> ]	2.13E+04	
Sulfate [SO <sub>4</sub> <sup>2-</sup> ]	5.12E+03	
<b>RCRA Hazardous Metals</b>		
Arsenic [As]	1.04E+01	
Barium [Ba]	4.99E+01	
Cadmium [Cd]	1.32E+00	
Chromium [Cr]	3.43E+01	
Lead [Pb]	1.05E+00	
Mercury [Hg]	7.29E+01	
Selenium [Se]	2.08E-01	
Silver [Ag]	9.98E-01	
<b>Other Metals</b>		
Aluminum [Al]	4.05E+03	
Boron [B]	4.28E+01	
Cobalt [Co]	8.38E-01	
Copper [Cu]	2.59E+00	
Iron [Fe]	5.01E+00	
Lithium [Li]	1.01E+01	
Manganese [Mg]	9.12E-01	
Molybdenum [Mo]	7.81E+00	
Nickel [Ni]	2.53E+00	
Sodium [Na]	1.19E+05	
Strontium [Sr]	9.41E-02	
Zinc [Zn]	6.18E+00	
<b>Organic Compounds</b>		
Tetraphenylborate [B(C <sub>6</sub> H <sub>5</sub> ) <sub>4</sub> <sup>-</sup> ]	5.00E+00	
Total Organic Carbon	4.31E+02	
<b>Total Insoluble Solids</b>		
Total Insoluble Solids	0.00E+00	

**Saltstone Production and Disposal Facility  
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**Consent Order of Dismissal, Section III.7 (1)  
Chemical and Radiological Composition of Salt Waste (continued)**

Radionuclide	Estimated Concentration (pCi/mL)	Updated Concentration (pCi/mL)
H-3	6.07E+02	
C-14	4.70E+02	
Co-60	2.56E-01	
Ni-59	1.78E-01	
Ni-63	8.92E+00	
Se-79	3.28E+01	
Sr-90	1.93E+03	
Y-90	1.93E+03	
Tc-99	1.93E+04	
Ru-106	2.57E+00	
Rh-106	2.57E+00	
Sb-125	1.76E+01	
Te-125m	1.76E+01	
I-129	1.43E+01	
Cs-134	1.14E+02	
Cs-137	1.21E+06	
Ba-137m	1.14E+06	
Ce-144	4.87E-02	
Pr-144	4.87E-02	
Pm-147	4.47E+01	
Eu-154	7.70E-01	
Np-237 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	6.63E+01	
Pu-238 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	7.66E+02	
Pu-239 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	7.33E+01	
Pu-240 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	7.33E+01	
Pu-241	2.89E+02	
Pu-242 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	7.19E+01	
Am-241 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	3.49E+00	
Am-242m	5.00E-02	
Cm-242 ( $\alpha$ )	4.10E-02	
Cm-244 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	1.22E+01	
Cm-245 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	3.60E-02	
Total Transuranic Alpha Emitters with ( $t_{1/2}$ ) > 5 years	3.50E+02	

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## Consent Order of Dismissal, Section III.7 (2) Formulation of Grout Used to Treat and Solidify the Salt Waste

The grout formulation is defined by the proportions of dry premix components (Type II Portland cement, Class F flyash, and Grade 120/100 slag) and the ratio of the water content in the salt waste to dry premix. Small quantities of admixtures are added as required for the purposes of set retardant and anti-foam. These have an insignificant effect on the overall grout composition (0.2 wt% of the overall grout composition).

The formulation used for the reporting period is shown below:

### Saltstone Dry Premix Composition

Component	Weight %
Type II Portland cement	10
Class F flyash	45
Grade 120/100 slag	45

### Water to Premix Ratio (by weight) – 0.59

The water to premix ratio reflects the pounds of free water added to the process for each pound of dry premix fed to the saltstone mixer averaged for the quarter.

Utilizing this grout formulation leads to an overall grout composition as shown below:

### Overall Grout Composition

(Due to rounding, numbers may not add to 100%)

Component	Weight %
Salt Waste	45
Type II Portland cement	6
Grade 120/100 slag	25
Class F flyash	25

# Saltstone Production and Disposal Facility Website Data – Fourth Quarter, Calendar Year 2013

## Consent Order of Dismissal, Section III.7 (3) Chemical and Radiological Composition of Saltstone

Chemical Name	Estimated Concentration (mg/L)	Updated Concentration (mg/L)
<b>Major Constituent</b>		
Water [H <sub>2</sub> O]	5.50E+05	
Portland (II) Cement	1.02E+05	
Class F Flyash	4.20E+05	
Grade 100/120 Slag	4.20E+05	
<b>Solvated Ions</b>		
Aluminate [Al(OH) <sub>4</sub> ]	8.91E+03	
Carbonate [CO <sub>3</sub> <sup>2-</sup> ]	7.56E+03	
Chloride [Cl]	3.12E+02	
Fluoride [F]	3.12E+02	
Hydroxide [OH]	2.06E+04	
Nitrate [NO <sub>3</sub> ]	8.50E+04	
Nitrite [NO <sub>2</sub> ]	1.33E+04	
Sulfate [SO <sub>4</sub> <sup>2-</sup> ]	3.20E+03	
<b>RCRA Hazardous Metals</b>		
Arsenic [As]	6.50E+00	
Barium [Ba]	3.12E+01	
Cadmium [Cd]	8.25E-01	
Chromium [Cr]	2.14E+01	
Lead [Pb]	6.56E-01	
Mercury [Hg]	4.55E+01	
Selenium [Se]	1.30E-01	
Silver [Ag]	6.24E-01	
<b>Other Metals</b>		
Aluminum [Al]	2.53E+03	
Boron [B]	2.67E+01	
Cobalt [Co]	5.24E-01	
Copper [Cu]	1.62E+00	
Iron [Fe]	3.13E+00	
Lithium [Li]	6.31E+00	
Manganese [Mg]	5.70E-01	
Molybdenum [Mo]	4.88E+00	
Nickel [Ni]	1.58E+00	
Sodium [Na]	7.45E+04	
Strontium [Sr]	5.88E-02	
Zinc [Zn]	3.86E+00	
<b>Organic Compounds</b>		
Tetraphenylborate [B(C <sub>6</sub> H <sub>5</sub> ) <sub>4</sub> <sup>-</sup> ]	3.12E+00	
Total Organic Carbon	2.69E+02	
<b>Total Insoluble Solids</b>		
Total Insoluble Solids	0.00E+00	

**Saltstone Production and Disposal Facility  
Website Data – Fourth Quarter, Calendar Year 2013**

**Consent Order of Dismissal, Section III.7 (3)  
Chemical and Radiological Composition of Saltstone (continued)**

Radionuclide	Estimated Concentration (pCi/mL)	Updated Concentration (pCi/mL)
H-3	3.79E+02	
C-14	2.94E+02	
Co-60	1.60E-01	
Ni-59	1.11E-01	
Ni-63	5.57E+00	
Se-79	2.05E+01	
Sr-90	1.21E+03	
Y-90	1.21E+03	
Tc-99	1.21E+04	
Ru-106	1.61E+00	
Rh-106	1.61E+00	
Sb-125	1.10E+01	
Te-125m	1.10E+01	
I-129	8.93E+00	
Cs-134	7.12E+01	
Cs-137	7.56E+05	
Ba-137m	7.12E+05	
Ce-144	3.04E-02	
Pr-144	3.04E-02	
Pm-147	2.79E+01	
Eu-154	4.81E-01	
Np-237 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	4.14E+01	
Pu-238 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	4.79E+02	
Pu-239 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	4.58E+01	
Pu-240 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	4.58E+01	
Pu-241	1.81E+02	
Pu-242 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	4.49E+01	
Am-241 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	2.18E+00	
Am-242m	3.12E-02	
Cm-242 ( $\alpha$ )	2.56E-02	
Cm-244 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	7.62E+00	
Cm-245 ( $\alpha$ ) ( $t_{1/2}$ ) > 5 yr	2.25E-02	
Total Transuranic Alpha Emitters with ( $t_{1/2}$ ) > 5 years	2.19E+02	